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Large Display Numeric LED with Profibus DP Interface

User's Manual

FEMA ELECTRÓNICA®

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Table of Contents

1 GENERAL 4

1.1 Display Functions 4

2 APPLICATION EXAMPLE 5

3 TECHNICAL DATA 6

3.1 Notes for the start-up 6

3.2 Device Configuration 7

3.3 Device or System Start-Up 8

3.4 Profibus DP Characteristic Data 9

3.5 Profibus DP 10
3.5.1 Configuration Data - Config_Data 10
3.5.2 Pararmeters Configuration Data - User_Prm_Data 11
3.5.3 User Data - Output_Data 11
3.5.4 Control Data 11
3.5.5 Control Byte 0 - Toggle Byte (TB) 11
3.5.6 Control Byte Byte 1 - Length Byte (LB) 11
3.5.7 Interface Data 12

3.6 Transmission Protocol 12

3.7 Example of Controlling 14

4 CONNECTOR PIN ASSIGNMENTS 15

4.1 Profibus DP Address 17

5 HOUSING DIMENSIONS 19

6 APPENDIX 20

6.1 Standard Equipment 20

6.2 Optional Accessories 20

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6.3	**Order Numbers**	**20**
6.4	**Displayable Characters**	**21**
6.5	**Maintenance and Care**	**22**
6.6	**Declaration of Conformity**	**23**
6.7	**Guarantee**	**24**
6.8	**Versions Overview**	**25**

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1 General

The large display numeric LED can be used universally for displaying production data, or as an information board.

The modular design allows for cost-effective models of various size, and with different character heights and numbers of digits.

Thus integration into existing equipment or systems is easy and simple.

1.1 Display Functions

- Data transmission: Profibus-DP
- Simple parameter setting and initial start-up
- Variable size thanks to modular display design.

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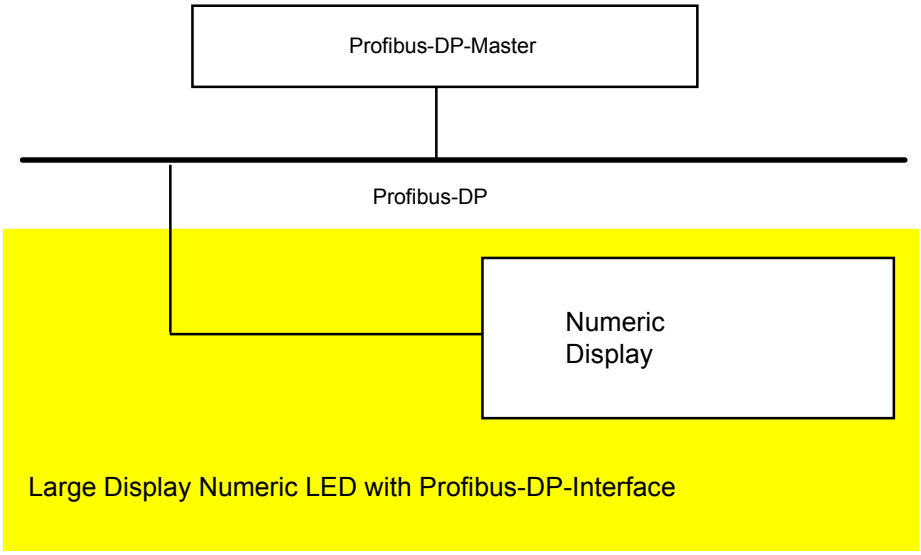
2 Application Example

Schematic diagram of the display unit at the interface:



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3 Technical Data

Overall Specifications

Display type:	7 segment LED
Character height:	60 mm (2.36''), 100 mm (3.94''), 150 mm (5.91''), 200 mm (7.87 ''), 250 mm (9.84'')
Digits:	1 to 15
Display color:	red, green, yellow
Character set:	see chapter "Displayable Characters"
View:	single or double sided
Interface:	Profibus-DP
Baud rate:	9.6 KBaud to 12 MBaud
Addresses:	1 to 127
Operating voltage:	230 V / 50 Hz, 110 V / 60 Hz or 24 VDC
Power Consumption:	60 mm (2.36'') approx. 1.3 W per digit 100 mm (3.94'') approx. 2.5 W per digit 150 mm (5.91'') approx. 7.0 W per digit 200 mm (7.87'') approx. 7.5 W per digit 250 mm (9.84'') approx. 10.0 W per digit
Housing:	industrial version, powder coated aluminium
Housing dimensions:	see chapters "Device Configuration" and "Housing Dimensions"
Mounting:	articulated arm or hanging mount bracket for wall mounting
Protection:	IP54 or IP65
Operating temp.:	0 to +50 °C
Storage temp.:	-25 to +70 °C

3.1 Notes for the start-up

- When putting on the power supply, the following sequence has to be observed:
  - Connect the power supply cable to the display.
  - Connect the power supply cable to the power supply.

- When disconnecting the power supply, the following sequence has to be observed:
  - Disconnect the power supply cable from the power supply.
  - Disconnect the power supply cable from the display.

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3.2 Device Configuration

Character Height:
☐ 60 mm 2.36'' ☐ 100 mm 3.94'' ☐ 150 mm 5.91'' ☐ 200 mm 7.87'' ☐ 250 mm 9.84''

Number of Lines:

_____

Number of digits per Line:

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10
☐ 11 ☐ 12 ☐ 13 ☐ 14 ☐ 15

Display colour:
☐ red ☐ green ☐ yellow

Dimensional display:
Line 1: _____ Line 5: _____
Line 2: _____ Line 6: _____
Line 3: _____ Line 7: _____
Line 4: _____ Line 8: _____

View:
☐ single sided ☐ double sided

Operating voltage:
☐ 230 V / 50 Hz ☐ 110 V / 60 Hz ☐ 24 V DC

Protection:
☐ IP54 ☐ IP65

Temperature range:
☐ 0 to +50 °C ☐ -25 to +50 °C

Housing dimensions: _____x_____x_____mm
_____x_____x_____inches

Housing colour: RAL _____

Housing material:
☐ Aluminium profile
☐ Stainless steel
☐ Sheet material

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3.3 Device or System Start-Up

The large display numeric LED performs internal memory and function tests while powering up.

The following data appear at the large format display:

- Baud rate
- Parity
- Data bits
- Stop bits
- - 1 2 3 4 5 ...
- Address.

The displayed values are of no significance for the Profibus DP user.

After powering up, the display waits for valid parameter, configuration and user data from the Profibus DP master. If no valid user data are available, the following message appears at the numeric display: „no-dP“.

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3.4 Profibus DP Characteristic Data

ID Number:	0x4097
Maximum Output Data:	24 Byte DP output data
Configuration:	2 flag bytes (0x27, 0x27) or 3 flag bytes (0x27, 0x27, 0x27)
Parameter Data:	Standard 7 Byte
User PRM:	none
Diagnosis:	Standard 6 Byte
External Diagnosis:	none
Transmission Speed:	9.6 kBaud / 19.2 kBaud / 93.75 kBaud / 187.5 kBaud / 500 kBaud / 1.5 MBaud / 3 MBaud, 6 MBaud, 12 MBaud
Protocol:	Profibus DP DIN19245, part 3
GSD Data:	IFGA.GSD

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3.5 Profibus DP

Communications between the Profibus master and the large format numeric display are accomplished by means of cyclical data transfer. The display has been designed for use with an output data width ranging from 10 to 24 bytes (according to the number of digits), and no input data. Output data width is selected during configuration.

3.5.1 Configuration Data - Config_Data

Configuration of the large format display is performed with 2 resp. 3 flag bytes (according to the number of digits). The flag used for this purpose is set to 8 bytes output, without consistency (DP standard 19245, part 3 = 0x27).

Data length for subsequent transmission of user data is determined based upon the selection of configuration data.

Number of Digits	Flag Bytes
1 to 7	2 x „8 Byte Output-Kennung“ (0x27, 0x27)
8 to 15	3 x „8 Byte Output-Kennung“ (0x27, 0x27, 0x27)

Notice:
If a flag byte unequal to the value 0x27 is transferred, a bus fault happens.

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3.5.2 Pararmeters Configuration Data - User_Prm_Data

The large format numeric display does not support any User_Prm_Data (expanded parameters configuration data). Transferred parameters configuration data from the User_Prm_Data area are checked for a zero data length. If User_Prm_Data are transferred, initialisation of the Profibus is disabled and the slave's parameters must be reconfigured.

3.5.3 User Data - Output_Data

The large numeric display supports up to 24 bytes of output data. Output data are subdivided into 2 bytes of control data, and up to 22 bytes of interface data.

- 2 bytes control data
- max. 22 bytes interface data

3.5.4 Control Data

Interface control for the large format numeric display is accomplished by means of the first two bytes of output data.

3.5.5 Control Byte 0 - Toggle Byte (TB)

The first byte of output data is saved to intermediate memory at the display unit immediately after Profibus initialisation has been completed, and is then always compared with the current content of the first output data. As soon as the value of the first byte of output data has changed, subsequent output data are evaluated and transfer of interface data to the large format display is started as required. The only evalution criterion is a change of content: the content itself is irrelevant. After changing the toggle byte you must wait at least 30 ms for the next change.

3.5.6 Control Byte Byte 1 - Length Byte (LB)

The second byte of output data indicates the number of data bytes which are to be transmitted to the large format display. Length is the equal to the sum of all interface data bytes (as of byte 3).

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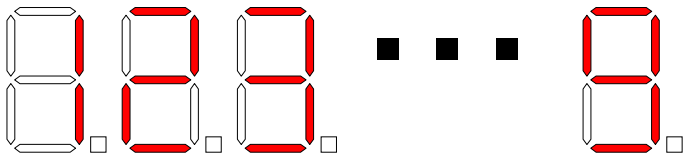
3.5.7 Interface Data

The large display numeric LED is ready for receipt of interface data starting with byte 3. Interface data are transferred in accordance with the number of bytes indicated by control byte 1, after a change has occurred to the content of control byte 0.

3.6 Transmission Protocol

Display Data Positioning:



The first transmitted character is displayed at position 1.
(Data are entered to the display from left to right.)

Protocol:

TB	LB	STX	ADRH	ADRL	P1	P2	P3	DB1...DB15	ETX

TB:	XX_H (toggle byte)
LB:	08_H to 16_H (08_D to 22_D)
	(length byte for subsequent user data)
STX:	$3C_H$ (start transmission)
ADRH:	30_H (display address, High, firmly oriented)
ADRL:	31_H (display address, Low, firmly oriented)
P1:	XX_H (point byte 1)
P2:	XX_H (point byte 2)
P3:	XX_H (point byte 3)
DB1-15:	Data (1 to 15 ASCII characters)
ETX:	$3E_H$ (end of transmission).

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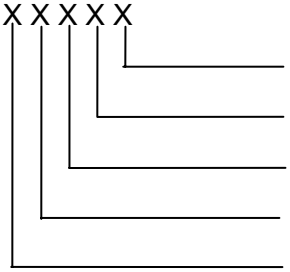
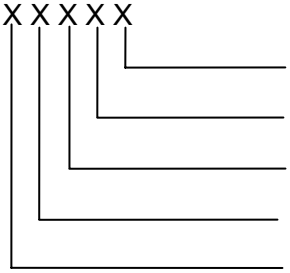
Point Byte Coding:
If a decimal point is required, the corresponding bit must be set to 1.

Point byte 1: 0 1 0 X X X X X



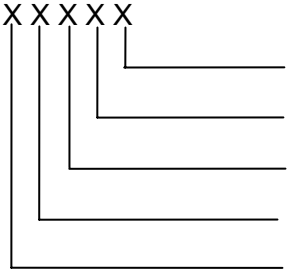
Point at digit 5
Point at digit 4
Point at digit 3
Point at digit 2
Point at digit 1

Point byte 2: 0 1 0 X X X X X



Point at digit 10
Point at digit 9
Point at digit 8
Point at digit 7
Point at digit 6

Point byte 3: 0 1 0 X X X X X



Point at digit 15
Point at digit 14
Point at digit 13
Point at digit 12
Point at digit 11

Point bytes 1 to 3 must always be transmitted, even if no decimal point is required. Point bytes P1 to P3 have a value of 40_H.

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3.7 Example of Controlling

Guideline:

- 4-digit display (→ flag bytes: 0x27, 0x27)
- Output of the characters „1 2 3 4“, then
- Output of the characters „8. 8. 8. 8.“

Sequence	Control Frame (hex)
1. Start of the Profibus DP communication	00 00 00 00 00 00 00 00 00 00 00 00 00
2. Input the frame data	00 **0B 3C 30 31 40 40 40 31 32 33 34 3E**
3. Transmit the frame	**01** 0B 3C 30 31 40 40 40 31 32 33 34 3E
4. Wait for transmission (30 ms at least)	01 0B 3C 30 31 40 40 40 31 32 33 34 3E
5. Input next frame data	01 **0B 3C 30 31 5E 40 40 38 38 38 38 3E**
6. Transmit the frame	**02** 0B 3C 30 31 5E 40 40 38 38 38 38 3E

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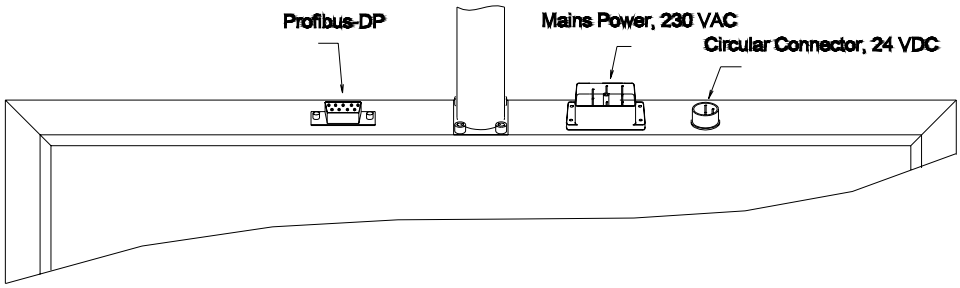
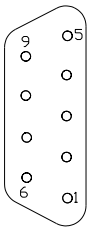
4 Connector Pin Assignments



9-Pole Sub-D Female Connector



PIN	Profibus-DP
1	n.c.
2	n.c.
3	Rx+ (higher voltage)
4	RTS
5	GND electrically isolated
6	5 VDC electrically isolated
7	n.c.
8	Rx- (lower voltage)
9	n.c.

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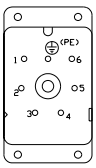
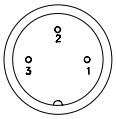
7-Pole Mains Plug (230 VAC)



PIN	Allocation
1	L1
2	N
(PE)	PE

3-Pole Circular Connector (24 VDC, optional)



PIN	Allocation
1	GND
2	+ 24 VDC
3	PE

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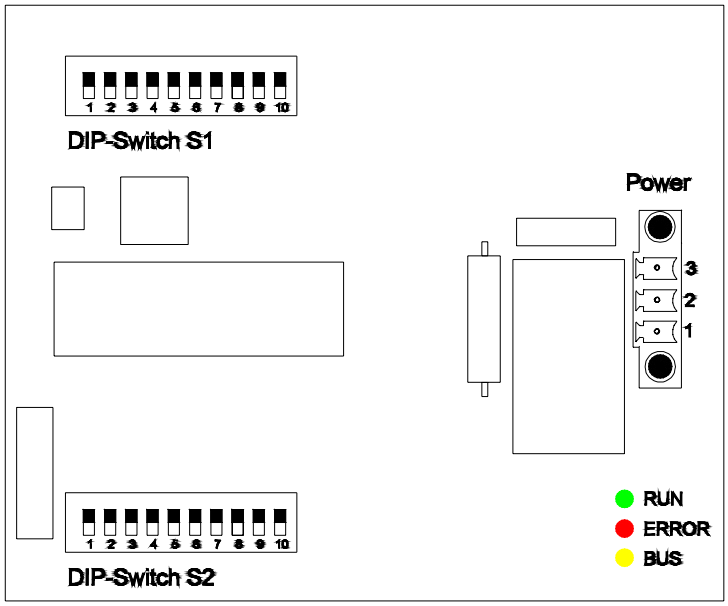
4.1 Profibus DP Address



LED 1, RUN	Power-up: Normal operation: Error:	Illuminated Blinks at approx. 2 Hz Continuously illuminated or off
LED 2, ERROR	Power-up: Normal operation: Connection to DP master: No connection:	Off Off Illuminated
LED 3, BUS	Power-up: Normal operation: Data transmission: No data transmission:	Off Illuminated Off

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10-Fold DIP-Switch (S1)

DIP-Switch		ON	OFF
DIP 1	DP-Adr. 2^0	1_D	0
DIP 2	DP-Adr. 2^1	2_D	0
DIP 3	DP-Adr. 2^2	4_D	0
DIP 4	DP-Adr. 2^3	8_D	0
DIP 5	DP-Adr. 2^4	16_D	0
DIP 6	DP-Adr. 2^5	32_D	0
DIP 7	DP-Adr. 2^6	64_D	0
DIP 8	n.c.	no function	no function
DIP 9	Bus Terminatior Profibus	active	inactive
DIP 10	Bus Terminatior Profibus	active	inactive

10-Fold DIP-Switch (S2)

DIP-Switch		ON	OFF
DIP 1	n.c.	no function	no function
DIP 2	n.c.	no function	no function
DIP 3	n.c.	no function	no function
DIP 4	n.c.	no function	no function
DIP 5	n.c.	no function	no function
DIP 6	n.c.	no function	no function
DIP 7	reserved		
DIP 8	reserved		
DIP 9	reserved		
DIP 10	reserved		

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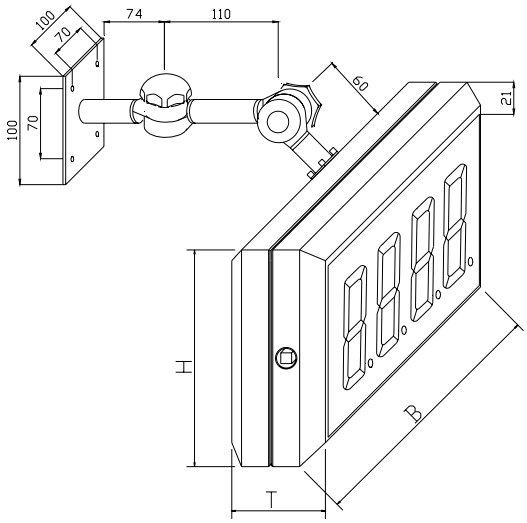
5 Housing Dimensions



mm:

Ziffernhöhe:		60 mm					100 mm					150 mm					200 mm					250 mm				
	B	H			T	B	H			T	B	H			T	B	H			T	B	H			T
Zeilen:		1	2	3			1	2	3			1	2	3			1	2	3			1	2	3	
2 Stellen	305	202	238	338	87	305	202	345	488	87	368	238	418	597	87	440	338	618	898	87	620	338	618	898	87
3 Stellen	305	202	238	338	87	440	202	345	488	87	440	238	418	597	87	620	338	618	898	87	720	338	618	898	87
4 Stellen	305	202	238	338	87	440	202	345	488	87	620	238	418	597	87	720	338	618	898	87	920	338	618	898	87
5 Stellen	440	202	238	338	87	620	202	345	488	87	720	238	418	597	87	920	338	618	898	87	1080	338	618	898	87
6 Stellen	440	202	238	338	87	620	202	345	488	87	820	238	418	597	87	1080	338	618	898	87	1298	338	618	898	87
7 Stellen	440	202	238	338	87	720	202	345	488	87	920	238	418	597	87	1218	338	618	898	87	1559	338	618	898	87
8 Stellen	620	202	238	338	87	820	202	345	488	87	1080	238	418	597	87	1378	338	618	898	87	1698	338	618	898	87
9 Stellen	620	202	238	338	87	920	202	345	488	87	1180	238	418	597	87	1559	338	618	898	87	1898	338	618	898	87
10 Stellen	620	202	238	338	87	1080	202	345	488	87	1298	238	418	597	87	1698	338	618	898	87	2098	338	618	898	87
11 Stellen	620	202	238	338	87	1080	202	345	488	87	1559	238	418	597	87	1858	338	618	898	87	2298	338	618	898	87
12 Stellen	720	202	238	338	87	1180	202	345	488	87	1559	238	418	597	87	2047	338	618	898	87	2498	338	618	898	87
13 Stellen	720	202	238	338	87	1360	202	345	488	87	1658	238	418	597	87	2178	338	618	898	87	2698	338	618	898	87
14 Stellen	820	202	238	338	87	1360	202	345	488	87	1778	238	418	597	87	2338	338	618	898	87	2898	338	618	898	87

inches:

Char. height:		2,36"					3,94"					5,91"					7,87"					9,84"				
	B	H			T	B	H			T	B	H			T	B	H			T	B	H			T
Lines:		1	2	3			1	2	3			1	2	3			1	2	3			1	2	3	
2 Digits	12	7,95	9,37	13,3	3,43	12	7,95	13,6	19,2	3,43	14,5	9,37	16,5	23,5	3,43	17,3	13,3	24,3	35,4	3,43	24,4	13,3	24,3	35,4	3,43
3 Digits	12	7,95	9,37	13,3	3,43	17,3	7,95	13,6	19,2	3,43	17,3	9,37	16,5	23,5	3,43	24,4	13,3	24,3	35,4	3,43	28,4	13,3	24,3	35,4	3,43
4 Digits	12	7,95	9,37	13,3	3,43	17,3	7,95	13,6	19,2	3,43	24,4	9,37	16,5	23,5	3,43	28,4	13,3	24,3	35,4	3,43	36,2	13,3	24,3	35,4	3,43
5 Digits	17,3	7,95	9,37	13,3	3,43	24,4	7,95	13,6	19,2	3,43	28,4	9,37	16,5	23,5	3,43	36,2	13,3	24,3	35,4	3,43	42,5	13,3	24,3	35,4	3,43
6 Digits	17,3	7,95	9,37	13,3	3,43	24,4	7,95	13,6	19,2	3,43	32,3	9,37	16,5	23,5	3,43	42,5	13,3	24,3	35,4	3,43	51,1	13,3	24,3	35,4	3,43
7 Digits	17,3	7,95	9,37	13,3	3,43	28,4	7,95	13,6	19,2	3,43	36,2	9,37	16,5	23,5	3,43	48	13,3	24,3	35,4	3,43	61,4	13,3	24,3	35,4	3,43
8 Digits	24,4	7,95	9,37	13,3	3,43	32,3	7,95	13,6	19,2	3,43	42,5	9,37	16,5	23,5	3,43	54,3	13,3	24,3	35,4	3,43	66,9	13,3	24,3	35,4	3,43
9 Digits	24,4	7,95	9,37	13,3	3,43	36,2	7,95	13,6	19,2	3,43	46,5	9,37	16,5	23,5	3,43	61,4	13,3	24,3	35,4	3,43	74,7	13,3	24,3	35,4	3,43
10 Digits	24,4	7,95	9,37	13,3	3,43	42,5	7,95	13,6	19,2	3,43	51,1	9,37	16,5	23,5	3,43	66,9	13,3	24,3	35,4	3,43	82,6	13,3	24,3	35,4	3,43
11 Digits	24,4	7,95	9,37	13,3	3,43	42,5	7,95	13,6	19,2	3,43	61,4	9,37	16,5	23,5	3,43	73,2	13,3	24,3	35,4	3,43	90,5	13,3	24,3	35,4	3,43
12 Digits	28,4	7,95	9,37	13,3	3,43	46,5	7,95	13,6	19,2	3,43	61,4	9,37	16,5	23,5	3,43	80,6	13,3	24,3	35,4	3,43	98,4	13,3	24,3	35,4	3,43
13 Digits	28,4	7,95	9,37	13,3	3,43	53,5	7,95	13,6	19,2	3,43	65,3	9,37	16,5	23,5	3,43	85,8	13,3	24,3	35,4	3,43	106	13,3	24,3	35,4	3,43
14 Digits	32,3	7,95	9,37	13,3	3,43	53,5	7,95	13,6	19,2	3,43	70	9,37	16,5	23,5	3,43	92,1	13,3	24,3	35,4	3,43	114	13,3	24,3	35,4	3,43

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6 Appendix

6.1 Standard Equipment

- Display unit with current software and hardware versions
- Square socket key
- User's manual
- Mating plug
- Floppy disk with device database file for original owner.

6.2 Optional Accessories

- Square socket key
- User's manual
- Floppy disk with device database file.

6.3 Order Numbers

Designation	Order number
Square socket key	G4-041
User's manual (A4 format, German)	X-M31-BSXX3X-002
User's manual (A4 format, English)	X-M32-BSXX3X-002

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6.4 Displayable Characters

The data bytes are ASCII-coded.

Lower ☞	Higher ☞	0000 0	0001 1	0010 2	0011 3	0100 4	0101 5	0110 6	0111 7
0000	0			"Blank"	0		P		P
0001	1				1	A	Q	A	Q
0010	2				2	b	r	b	r
0011	3				3	c	S	c	S
0100	4				4	d	t	d	t
0101	5				5	E	u	E	u
0110	6				6	F		F	
0111	7				7	G		G	
1000	8			[	8	H		H	
1001	9			]	9	I	y	I	y
1010	A					J		J	
1011	B								
1100	C					L		L	
1101	D			-					
1110	E					n		n	
1111	F					o	_	o	

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6.5 Maintenance and Care

Observe the following instructions in order to assure best possible performance of the display.

- Make sure that the housing can be opened for adjustment and maintenance even after the display has been installed. Allow for adequate clearance at the back, front and top of the display unit in order to follow for sufficient ventilation (if vent slots are included).
- Display quality is impaired by direct illumination with bright light sources and/or direct sunlight.
- The display must be switched off before cleaning.
- Protect the display from excessive humidity, extreme vibration, direct sunlight and extreme temperatures. Non-observance may lead to malfunctioning or destruction of the device. Under certain circumstances electrical shock, fire and explosion may occur as well. Information concerning allowable ambient conditions, including recommended temperature ranges, can be found in the chapter entitled „Technical Data“.
- The display may not be placed into service if the device and/or the power cable are known to be damaged.
- Do not attempt to repair the device yourself. The guarantee is rendered null and void if the device is tampered with by unauthorised persons.

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6.6 Declaration of Conformity

microSYST Systemelectronic GmbH, Zur Centralwerkstätte 10,
92637 Weiden, Germany

does hereby declare that the product described in this user's manual,

"migan FI DP"

to which this declaration makes due reference,
is in compliance with the following standards or normative documents:

Interference emission: generic standard EN 50081 - 2, issued July 1993
Product standard: EN 55011; group 1/2; class A, issued March 1991
Limit values identical to EN 55022

Interference immunity: generic standard EN 50082 - 2, issued March 1995
Basic specification per table

In accordance with regulations specified by guideline 89/336/ EWG (and EMVG).

Weiden, 22 November 1999 microSYST Systemelectronic GmbH

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6.7 Guarantee

The display is guaranteed for the duration of the legally specified period against defects which existed at the time the device was delivered to the buyer.

The device is subject to technical change without notice. Errors and omissions are accepted. No claims can be honoured for the shipment of a new product. The buyer is required to make notification of defects within 2 weeks after identification of such. Non-observance of notification requirements is equated with acceptance of the defect.

Defects and their symptoms must be described as accurately as possible in order to allow for reproducibility and elimination. The buyer must provide for access to all required and/or useful information regarding defects at no charge, as well as to the affected devices, and must make all of the required data and machine time available free of charge.

The guarantee does not cover defects which result from non-observance of the prescribed conditions of use, or from improper handling.

If the device has been placed at the disposal of the buyer for test purposes and has been purchased subsequent to such testing, both parties agree that the product is to be considered “used” and that it has been purchased “as is”. No guarantee claims may be made in such cases.

The “General Terms and Conditions” regarding manufactured products and services rendered for the electrical industry apply as well.

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6.8 Versions Overview

Ver.	Date	Remark, Description
1.00	06/21/00	
2.00	01/11/01	new Profibus-PCB
2.10	12/12/01	Kreuzer: Character height changed
2.20	12/19/01	Kreuzer: Housing dimensions changed
2.30	12/17/02	Kreuzer: New logo
2.40	10/20/03	Kreuzer: Noes for the start-up
2.50	5/13/04	Kreuzer: Changes at configuration data, output data length, designation Rx+/-, example of controlling added

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